FUNCTIONAL HAZARD ASSESSMENT

NVG AND AIRCRAFT SYSTEMS REQUIRED FOR NVG FLIGHT

Assumptions:

Inadvertent IMC (IIMC) - There is an increased probability of pilots entering IIMC due to the operating characteristics of NVG. The loss of useable external cues due to atmospheric obscurants, such as fog or snow, can be more abrupt than when flying under daylight conditions.
Near Obstacles - The term is used in the context that use of NVG is required in order to safely control the flight path and avoid obstacles/terrain in the short-term. If the pilot were unable to see obstacles/terrain then it is expected that a controlled flight into terrain would occur within the next 30 seconds. The actual obstacle/terrain clearance required, both vertically and laterally, depends on the aircraft velocity and aircraft manoeuvrability.
Flight Instrument Lighting - It is assumed in this document that the primary and secondary lighting systems are both NVG compatible.

SYSTEM	FAILURE	Phase of Flight	FAILURE EFFECT CATEGORY	REMARKS
NVG	Complete loss of external view	All except Near Obstacles	Major	Pilot will no longer be able to avoid obstacles/terrain using NVG and will be forced to revert to Night unaided flight. This results in increased pilot workload.
	Complete loss of external view	Near Obstacles	Hazardous/ Severe-Major	The pilot can not see and avoid obstacles.
	Degraded image	All except Near Obstacles	Major	Image severely degraded
	Degraded image	Near Obstacles	Hazardous/ Severe-Major	Image severely degraded

SYSTEM	FAILURE	Phase of Flight	FAILURE EFFECT CATEGORY	REMARKS
Interior Lighting	Failure of Flight instrument primary lighting	All	Minor	Secondary instrument lighting provides adequate light for pilot to complete flight, possibly using alternative profile/ emergency procedures
	Failure of flight instrument secondary lighting	All	Minor	Slight Reduction in safety margins due to a loss of flight instrument lighting redundancy.
	Failure of all flight instrument lighting	All except IIMC	Major	Pilot will have to initiate emergency procedures, and recover the aircraft using alternative flight profile.
	Failure of all flight instrument lighting	IIMC	Hazardous/ Severe-Major	Pilot will be able to use standby ADI for attitude reference, and use flashlight/ lip light to illuminate flight instruments
	Failure of Powerplant/system instrument lighting	All except Hover	Minor	
	Failure of Powerplant/system instrument lighting	Hover	Major	Pilot could exceed powerplant/system limitations
	Appearance of incompatible light in cockpit/instrument panel	All except Near Obstacles	Major	
	Appearance of incompatible light in cockpit/instrument panel	Near Obstacles	Hazardous/ Severe-Major	Pilot will be unable to see and avoid obstacles/terrain

SYSTEM	FAILURE	Phase of Flight	FAILURE EFFECT CATEGORY	REMARKS
Exterior Lighting	Failure of Landing/Searchlight	All except Near Obstacles	Minor	
	Failure of Landing/Searchlight	Near Obstacles	Major	
	Appearance of Incompatible reflections in cockpit from exterior light source	All except Near Obstacles	Major	Due to failure of a shroud/filter etc that was necessary to prevent unacceptable reflections or direct radiation of incompatible exterior lights into the cockpit
	Appearance of Incompatible reflections in cockpit from exterior light source	Near Obstacles	Hazardous/ Severe-Major	Due to failure of a shroud/filter etc that was necessary to prevent unacceptable reflections or direct radiation of incompatible exterior lights into the cockpit. Pilot will be unable to see and avoid obstacles/terrain
Flight Instrument	Altimeter False Indications	All except IIMC	Major	If Altimeter over-reads the pilot will be dangerously close to the ground
	Altimeter False Indications	IIMC	Catastrophic	If Altimeter over-reads the pilot will not maintain adequate separation from the terrain.
	VSI failure	All except Low speed descent	Minor	
	VSI failure	Low Speed descent	Major	Pilot will not get timely cues of being in conditions favourable to vortex ring state
	VSI False Indications	All except Low speed descent	Minor	
	VSI False Indications	Low Speed descent	Major	Pilot will get false sense of security despite being in conditions favourable to vortex ring state

SYSTEM	FAILURE	Phase of Flight	FAILURE EFFECT CATEGORY	REMARKS
Flight Instrument	RAD ALT failure	All except Near Obstacles	Minor	Pilot will be unsure of terrain clearance
	RAD ALT failure	Near Obstacles	Hazardous/ Severe-Major	Pilot will be unaware of proximity to terrain
	RAD ALT False Indications	All except Near Obstacles	Major	Pilot will think that adequate clearance from terrain is maintained, when clearance will be less than expected
	RAD ALT False Indications	Near Obstacles	Hazardous/ Severe-Major	Pilot will think that adequate clearance from terrain is maintained, when clearance is actually dangerously low
	Low Altitude Warning Failure	All	Major	Pilot will not get warned of descending below a preset safety altitude
	Low Altitude Warning False Indications	All	Major	Pilot will get false warnings of descent below a preset safety altitude, which will increase pilot workload